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| 10/509,854      | 09/30/2004  | Saila Marjatta Karvinen | 26360U              | 4309             |

20529 7590 09/19/2005

NATH & ASSOCIATES  
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WASHINGTON, DC 20005

EXAMINER

HAILEY, PATRICIA L

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1755

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/509,854

Applicant(s)

KARVINEN ET AL.

Examiner

Patricia L. Hailey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date September 30, 2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

Applicants' Preliminary Amendment, filed on September 30, 2004, has been made of record and entered. No claims have been canceled or added; claims 1-15 remain pending in this application.

***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Applicants' Priority Document was filed on September 30, 2004.

***Claim Objections***

2. *Claim 6 is objected to because of the following informalities:*

In line 4 of claim 6, the word "suphuric" appears to be the word "sulphuric" misspelled.

- Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. *Claims 13-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.*

Claims 13-15 all recite the limitation "Use of a titanium dioxide prepared...", which renders the claims directed to non-statutory subject matter.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. ***Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.***

Claims 1-15 are indefinite because the basis on which the weight percentages recited therein cannot be determined. For example, is the sulphur content recited in claim 1 based on by weight or volume of the "crystalline product"? Additionally, it cannot be determined if the percentage ranges of chromium or iron recited in claim 12 are based on weight or volume of the claimed photocatalyst.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. ***Claims 1-4 and 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mabbs et al. (U. S. Patent No. 3,341,291).***

Mabbs et al. disclose a process for producing pigmentary titanium dioxide, wherein an impure iron-containing titaniferous material, such as ilmenite, is digested with a limited amount of hot concentrated sulfuric acid, and the resultant solid is then dissolved, normally in water or dilute sulfuric acid. The solution thus formed is then subjected to various treatments, such as the reduction of the iron content to the ferrous

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state, removal of undissolved solids by clarification and some of the dissolved iron by concentration and cooling. To this solution are added, or are formed in situ, rutile- or anatase inducing nuclei, and the resulting mixture is heated to hydrolyze the titanium sulfate in solution and to precipitate hydrous titanium dioxide. See col. 1, lines 31-46 of Mabbs et al.

The latter is filtered off, and subjected to various washing procedures to remove excess acid and color-forming impurities, such as iron or chromium compounds. See col. 1, lines 47-49 of Mabbs et al.

Mabbs et al. also disclose that, in the above process, impurities such as chromium, and iron cannot be completely removed from the pigmentary titanium dioxide. See col. 1, lines 62-72 of Mabbs et al. (considered to read upon claims 8 and 9).

Mabbs et al. also disclose a process comprising dissolving titanium dioxide in sulfuric acid and heating until precipitation of titanyl sulfate begins, thereafter adding aqueous sulfuric acid, separating precipitated titanyl sulfate from the mother liquor, and re-dissolving it in aqueous liquid, hydrolyzing the solution so obtained, and thereafter recovering and calcining the hydrous titanium dioxide thus formed. See col. 2, lines 5-13 of Mabbs et al.

Mabbs et al. also disclose that, after nucleation with the desired nuclei (either rutile or anatase, depending on the desired form of the final product), the solution is normally heated to a temperature of at least 70°C and particularly to a temperature

ranging from 90°C to the boiling point, until there is no further precipitation of hydrous titanium dioxide. See col. 3, lines 36-51 of Mabbs et al.

The above disclosures are considered to read upon claims 1, 3, 4, 6, 7, and 11. Further, because Mabbs et al. do not disclose the employment of any basic compounds, Mabbs et al. is also considered to meet the limitations of claim 2.

Although Mabbs et al. do not explicitly disclose a sulfur content in the titanium dioxide (e.g., claims 1 and 10), it is considered that, because Mabbs et al. disclose a process comparable to that instantly claimed (e.g., by employing ilmenite and sulfuric acid), one of ordinary skill in the art would reasonably expect the titanium dioxide product of Mabbs et al. to contain sulfur in amounts comparable to that respectively claimed, absent the showing of convincing evidence to the contrary. For this same reason, one of ordinary skill in the art would also find reasonable expectation in the titanium dioxide product of Mabbs et al. to exhibit a specific surface area comparable to that respectively claimed.

In the Examples of Mabbs et al., exemplary titanium dioxides having specified amounts of iron and chromium (in the form of oxide) are depicted. See, for example, col. 4, lines 30-46 of Mabbs et al.; this disclosure is considered to read upon claim 12.

Further, with respect to claims 13-15, although Mabbs et al. do not disclose the titanium dioxide produced by Patentees' process as a "photocatalyst", it would have been obvious to one skilled in the art at the time the invention was made to find reasonable expectation that Patentees' disclosed titanium dioxide could acceptably

function as a photocatalyst, given that Patentees' process reads upon the instantly claimed process.

**11. *Claims 1, 5, 10, 11, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 10-230169 (Applicants' submitted art; hereinafter "the Japanese Patent"; translation provided by the Examiner).***

The Japanese Patent discloses a titanium dioxide photocatalyst having a specific surface area ranging from 130 to 350 m<sup>2</sup>/g. See the claims, as well as paragraphs [0012] and [0027].

The photocatalyst powder exhibits high activity in the environment of nitrogen oxides, and for environmental clarification. See paragraph [0013] of the Japanese Patent; this disclosure is considered to read upon claims 13-15.

The titanium dioxide is prepared by performing heat treatment at 100°C to 400°C, using anatase titanium dioxide as a seed crystal, of a sulfuric acid-titanyl water solution. See paragraph [0014] of the Japanese Patent, as well as paragraph [0065].

The Japanese Patent does not explicitly disclose a sulfur content present in the titanium oxide. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to reasonably expect that the titanium dioxide produced by the process disclosed in the Japanese Patent would exhibit a sulfur content comparable to that respectively claimed, absent the showing of convincing



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evidence to the contrary, given that the Japanese Patent discloses Applicants' claimed process steps.

### *Conclusion*

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

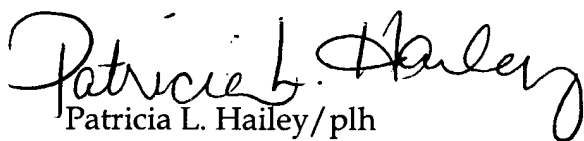
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia L. Hailey whose telephone number is (571) 272-1369. The examiner can normally be reached on Mondays-Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo, can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group 1700 Receptionist, whose telephone number is (571) 272-1700.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Patricia L. Hailey/plh  
Examiner, Art Unit 1755  
September 13, 2005



J.A. LORENZO  
SUPERVISORY PATENT EXAMINER